

WO2004/000565

PCT/EP2003/006090

New claims 1 to 18

(replace claims 1 to 19)

1. A printing device with an electro-photographic print unit (30), to which a transfer medium (34) for transferring a toner powder to a substrate (13) in a transfer zone is assigned, wherein the substrate (13) can be conducted through the transfer zone by means of a transport system (10), wherein heat energy can be introduced into the substrate (13) by means of one or several heating elements (24), wherein a cooling device (35) is assigned to the transfer medium (34), which removes heat from the latter,

characterized in that

at the transfer zone formed with the substrate (13), the transfer medium (34) has a lower temperature, at least in the area of the contact face, than the surface of the substrate (13).

2. The printing device in accordance with claim 1,

characterized in that

the cooling device (35) cools the temperature of the transfer medium (34) to a temperature $\leq 60^{\circ}\text{C}$.

3. The printing device in accordance with claim 1 or 2,
characterized in that
the cooling device (35) cools the temperature of the transfer medium (34) to
a temperature $\leq 40^{\circ}\text{C}$.

4. The printing device in accordance with one of claims 1 to 3,
characterized in that
the toner transfer in the transfer zone can be affected by means of one or
several coronas (12).

5. The printing device in accordance with one of claims 1 to 4,
characterized in that
the substrate (13) is placed on an electrically conductive base, and in respect
to the charge of the toner, the base is charged with the reverse polarity sign.

6. The printing device in accordance with one of claims 1 to 5,
characterized in that
the substrate (13) is moved past the transfer medium (34) synchronously in
respect to the circumferential speed of the transfer medium (34) by means of a transport
system (10), and
a charge with the opposite polarity sign of the charge of the toner is applied to
the transfer medium (34) in the transport system (10).

7. The printing device in accordance with one of claims 1 to 6, characterized in that
on its surface which receives the toner powder, the transfer medium (34) is provided with an anti-adhesive layer (34.3), and
this anti-adhesive layer (34.3) has a surface energy within the range of 15 mN/m to 30 mN/m.

8. The printing device in accordance with one of claims 1 to 7, characterized in that
the substrate (13) can be charged with heat energy by means of one or several a heating elements designed as infrared radiators and/or hot air blowers and/or by means of the application of a flame.

9. The printing device in accordance with one of claims 1 to 8, characterized in that
the substrates (13) to be imprinted are heated to the required temperature in an upstream-located temperature process, for example in a continuous throughput oven with ambient air heaters.

10. The printing device in accordance with one of claims 1 to 9, characterized in that
the heating element (24) heats the surface of the substrate (13) to a surface temperature range between 80°C and 200°C, at least in certain areas.

11. The printing device in accordance claim 10,
characterized in that
the surface temperature of the substrate (13) is 100°C to 170°C, at least in
certain areas.

12. The printing device in accordance with one of claims 1 to 9,
characterized in that
a temperature sensor (21) is assigned to the substrate (13), and
the heating element (24) and/or the transport system (10) can be controlled by
means of a control device (23) as a function of the signal emitted by the temperature sensor
(21).

13. The printing device in accordance with one of claims 1 to 12,
characterized in that
several temperature sensors (21) are arranged over the entire print width, and
a heating element (24) is assigned to each of the temperature sensors (21), and
the heating output can be separately controlled within zones over the print
width.

14. The printing device in accordance with claim 13,
characterized in that
the temperature sensor (21) is a pyrometer.

15. The printing device in accordance with one of claims 1 to 14, characterized in that one or several liquid-cooled contact rollers of the cooling device (35) roll off on the transfer medium (34), and/or a climate-controlled air flow is directed onto the surface of the transfer medium.

16. The printing device in accordance with one of claims 1 to 15, characterized in that the transfer medium (34) is embodied as a transfer roller or a transfer belt, which contains at least a portion of the cooling device (34).

17. The printing device in accordance with claim 16, characterized in that the transform medium (34) embodied as a transfer roller has interior air cooling.

18. The printing device in accordance with one of claims 1 to 17, characterized in that the cooling device (35) removes heat energy from the transfer medium (34) downstream of the transfer zone and upstream of the photoconductor (32) of the print unit (30) in the transport direction of the transfer medium (34).